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COMMUNICATION I

Pectinesterase Extraction from Guava

ABSTRAK

Pektinesterase telah diekstrak daripada buah jambu (Vietnamese var.) dan diasai. Didapati kepekatan NaCl dan pH mempengaruhi proses ekstraksi pektinesterase daripada buah ini. Nilai ekstraksi paling tinggi iaitu 2.5 mikro mol COOH/min/ml ekstraksi kasar diperolehi menggunakan larutan NaCl 1.75M pada pH 8.0.

ABSTRACT

Pectinesterase (PE) was extracted from guava (Vietnamese variety) fruit and assayed. pH and NaCl concentration influenced the extraction process of PE from this fruit. The highest PE extraction value at pH 8.0 and with 1.75M NaCl solution was 2.5 micro-equivalent COOH/min/ml crude extract.

INTRODUCTION

The suspended material of fruit and vegetable juices, commonly referred to as "cloud", is an unstable colloidal system and its breakdown affects the appearance and quality of the product. The enzyme pectinesterase (PE) is considered to be the causative agent of cloud loss. Due to the action of PE, pectin is de-esterified and then coagulated by Ca^{++} ions in the juice. As a result, loss of cloud occurs and the juice separates into a clear supernatant and a layer of sediment. Therefore it is of interest to purify the PE from guava fruit to see its effect on cloud loss. But an effective method of extracting this enzyme from guava is necessary before its purification. In this work a study is described to investigate the effect of pH and NaCl concentration (extractant) on the extractability of pectinesterase from guava (*Psidium guajava* L.) fruit.

MATERIALS AND METHODS

Extraction of Enzyme.

Fruits were washed, dried and cut into small pieces. The ratio of the fruit to extractant was 1:2. Fruits were blended with either deionised water or NaCl solution of various concentrations (0.25M - 2.0M) in a Waring blender. Crude PE was extracted by incubating the homogenate at pH 7.0, 7.5 and 8.0 in a cold room (at 4°C) for two hours. The pH was adjusted by addition of 2M NaOH or 2M HCl solution. The homogenate was squeezed through muslin cloth and the extract was centrifuged at 15,000 x *g* for 10 minutes at 4°C. The supernatant was used as a crude PE extract.

Pectinesterase Activity

The PE activity was determined by the method described by Kertesz (1955). Briefly, the method consists of titrimetric measurement of the rate of release of carboxyl groups from 1% pectin in 0.1M NaCl solution at pH 7.5 and 30°C. One unit is defined as the activity corresponding to the release of 1 micro-mole carboxyl groups per minute.

RESULTS AND DISCUSSION

The results in *Fig. 1* are the average of duplicates showing the effect of pH and NaCl concentration on the extraction of PE from guava fruit. It was found that both pH and NaCl concentration influenced PE extraction. The results obtained in this study show that as the pH of the extraction medium was increased from 7.0 to 8.0, the optimum NaCl concentration for PE extraction shifted from 1.0M to 1.75M. When PE was extracted at pH 8.0 the optimum NaCl concentration was found to be 1.75M. Increasing the salt concentration up to 2.0M or decreasing it to zero concentration (extraction in pure water), lowered the extraction values. Similar results were obtained for pH 7.0 and 7.5. As a result pH 8.0 was found to be the best for PE extraction from guava at a NaCl concentration of 1.75M (2.5 units) followed by 1.5M (2.1 units). However, pH above 8.0 has not been recommended for PE extraction because excessively high pH inactivates the enzyme (Kertesz 1955).

These results differ from those obtained by Al-Delaimy and Ali (1969) who found that apple

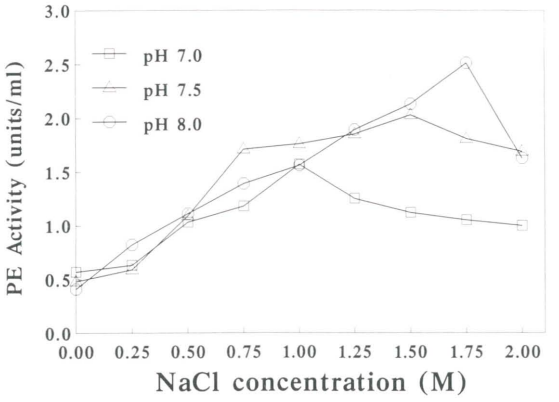

Fig. 1: Effect of pH level and NaCl concentration on PE extraction from guava fruit.

PE was best extracted at pH 7.5 and with 1.5M NaCl solution. Pressay and Avants (1972) and Rillo *et al.* (1992) extracted PE from tomato and mandarin orange by using 1.0M NaCl adjusted to pH 6.0 and 8.0, respectively. On the other hand, orange PE was successfully extracted with 0.25M NaCl solution at pH 7.0 (Korner *et al.* 1980). The relationship of pH and NaCl concentration on PE extraction is not clearly understood. In the extraction of PE from different fruits and vegetables such as apple (Al-Delaimy and Ali 1969), tomato (Pressay and Avants 1972), orange (Korner *et al.* 1980), mandarin orange (Rillo *et al.* 1992) and papaya (Fayyaz *et al.* 1993), different responses to the pH and NaCl concentration of the extraction medium were shown. From these results it may be concluded that this variation may be due to the differences in the texture and maturity of the fruit and it seems advisable to develop and optimise an extraction procedure for a given fruit.

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